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EXAMINER

WARE, CICELY Q

ART UNIT	PAPER NUMBER
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2611

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

09/865,763

Applicant(s)

MITLIN, VLAD

Examiner

Cicely Ware

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,8-10,12,18-20,22-24,26,27,32,42 is/are rejected.
- 7) ☒ Claim(s) 3-7,11,13-17,21,25,28-31 and 33-41 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 11/17/2006 have been fully considered but they are not persuasive.

a. On Pgs. 13-17 of applicant's REMARKS, applicant state that Raleigh et al. does not disclose "selecting the bit load per sub-channel based on the self-similarity property of the constellation".

Examiner disagrees. Examiner states that Raleigh et al. in fact discloses "selecting the bit load per sub-channel based on the self-similarity property of the constellation" (col. 23, lines 62-67, col. 25, lines 34-37). The self-similarity property disclosed by Raleigh et al. is the Euclidean distance which is chosen with the bit-loading (col. 25, lines 34-37) and the bit loading is modified for each sub-channel (col. 23, lines 62-64).

Therefore the original rejection stands.

b. However upon further consideration of claim 1. Raleigh et al. in fact also discloses the amendment inserted to claim 1 by applicant. Claim 1 now recites "selecting the bit load per sub-channel using an improved estimate of the bit error per symbol error". Raleigh et al. discloses wherein there are a multitude of less sophisticated adaptive bit loading algorithms that can be advantageously applied to a substantially independent set of frequency sub-channels (col. 25, lines 55-61).

Examiner asserts that this recitation encompasses applicant's amendment to claim 1.

c. With regard to claim 2, examiner asserts that Kennard et al. discloses the

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elements of claim 2, wherein Kennard et al. discloses a bit stuffing procedure for each sub-channels.

Claim Objections

2. Claim 37 is objected to because of the following informalities:

- a. With regard to claim 37, claim 37 depends on itself. Examiner suggests applicant insert the correct claim that 37 depends on for clarification purposes. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 1, recites the limitation "the bit error per symbol error" in lines 4-5. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 2, recites the limitation "the Hamming distances" in line 3. There is insufficient antecedent basis for this limitation in the claim.
6. Claim 19, recites the limitation "the bit error per symbol error" in lines 4-5. There is insufficient antecedent basis for this limitation in the claim.
7. Claim 23, recites the limitation "the bit error per symbol error" in lines 4-5. There is insufficient antecedent basis for this limitation in the claim.
8. Claim 25, recites the limitation "the Hamming distances" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

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9. Claim 26, recites the limitation "the bit error per symbol error" in lines 5-6. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 27, recites the limitation "the Hamming distances" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1, 8, 10, 12, 18, 19, 20, 22, 23, 24 and 26, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent 6,888,789) in view of Raleigh et al. (US Patent 6,452,981).

(1) With regard to claim 1, Sakoda et al. discloses a method of selecting a bit load per sub-channel in a multicarrier system, the multicarrier system encoding data based on a constellation of points, each point representing a tuple of data, the constellation having a self-similarity property (col. 15, lines 60-67 – col. 16, lines 1-15).

However Sakoda et al. does not disclose in selecting the bit load per sub-channel based on the self-similarity property of the constellation.

However Raleigh et al. discloses in selecting the bit load per sub-channel using an improved estimate of the bit error per symbol error based on the self-similarity

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property of the constellation (col. 5, lines 35-67 – col. 6, lines 1-5, col. 23, lines 60-67, col. 24, lines 56-67, col. 25, lines 1-40, col. 26, lines 8-11, 22-25).

Therefore it would have been obvious to one of ordinary skill in the art to modify Sakoda et al. in view of Raleigh et al. to incorporate selecting the bit load per sub-channel based on the self-similarity property of the constellation in order effectively take advantage of multiple transmitter antennas and/or multiple receiver antennas to ameliorate the deleterious effects of the inherent characteristics of wireless media (Raleigh et al., col. 1, lines 60-63).

(2) With regard to claim 8, claim 8 inherits all the limitations of claim 1. Sakoda et al. discloses in (Figs. 8 and 9) wherein said constellation is square.

(3) With regard to claim 10, claim 10 inherits all the limitations of claim 1. Raleigh et al. further discloses in determining a mean square deviation of the number of bit errors in an erroneous tuple; wherein said selecting further comprises selecting the bit load per sub-channel based on said mean square deviation of the number of bit errors in a erroneous tuple (col. 24, lines 14-55).

Raleigh et al. does not explicitly disclose mean square deviation. Raleigh et al. discloses wherein several bit loading algorithms can be used. However it is well known in the art that in probability and statistics, the standard deviation is the most commonly used measure of statistical dispersion. Simply put, it measures how spread out the values in a data set are. The standard deviation is defined as the square root of the variance. This means it is the root mean square (RMS) deviation from the average.

(4) With regard to claim 12, claim 12 inherits all the limitations of claim 10.

Sakoda et al. further discloses in (Figs. 8 and 9) wherein at large values of the mean square deviation of the number of bit errors in an erroneous tuple tends to the square root of two (col. 16, lines 1-36).

(5) With regard to claim 18, claim 18, claim 18 inherits all the limitations of claim 1. Sakoda et al. discloses wherein a parameter having said self-similarity property is a Hamming distance of the points of the constellation (col. 16, lines 1-15).

(6) With regard to claim 19, see rejection of claim 1.

(7) With regard to claim 20, claim 20 inherits all the limitations of claim 19. See rejection of claim 10.

(8) With regard to claim 22, claim 22 inherits all the limitations of claim 19. See rejection of claim 18.

(9) With regard to claim 23, see rejection of claim 1.

(10) With regard to claim 24, claim 24 inherits all the limitations of claim 23. See rejection of claim 20.

(11) With regard to claim 26, see rejection of claim 1. Raleigh et al. further discloses selecting the bit load per sub-channel using an improved estimate of the bit error per symbol error based on the self-similarity property of the constellation, and forward error correction parameters; and means for selecting a bit load based on the coding gain (col. 5, lines 35-67 – col. 6, lines 1-5, col. 23, lines 54-67, col. 24, lines 56-67, col. 25, lines 1-40, 55-61, col. 26, lines 8-11, 22-25).

(12) With regard to claim 32, claim 32 inherits all the limitations of claim 26. See rejection of claim 8.

13. Claims 2, 18, 22, 27, 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent 6,888,789) in view of Raleigh et al. (US Patent 6,452,981), as applied to claims 1, 19, 26, in further view of Kennard et al. (US Patent 4,855,692).

(1) With regard to claim 2, claim 2 inherits all the limitations of claim 1. Sakoda et al. in combination with Raleigh et al. disclose all the limitations of claim 1.

However Sakoda et al. in combination with Raleigh et al. do not disclose determining a probability of having bit errors in an erroneous tuple based on the Hamming distance between the points of the constellation.

However Kennard et al. discloses determining a probability of having bit errors in an erroneous tuple based on the Hamming distance between the points of the constellation (col. 2, lines 12-34, col. 5, lines 56-68, col. 6, lines 64-68, col. 7, lines 1-49).

Therefore it would have been obvious to one of ordinary skill in the art to modify the inventions of Sakoda et al. in combination with Raleigh et al. in view of Kennard et al. to incorporate determining a probability of having bit errors in an erroneous tuple based on the Hamming distance between the points of the constellation in order to simplify the coding and decoding circuitry required for converting between the signal points in the phase plane and the digital signals which they represent (Kennard et al., col. 1, lines 39-42).

(2) With regard to claim 18, claim 18 inherits all the limitations of claim 1.

Kennard et al. further discloses wherein the self-similarity is determined with respect to a Hamming distance between the points of the constellation (col. 2, lines 12-34, col. 5, lines 56-68, col. 6, lines 64-68, col. 7, lines 1-49).

(3) With regard to claim 22, claim 22 inherits all the limitations of claim 19. See rejection of claim 18.

(4) With regard to claim 27, claim 27 inherits all the limitations of claim 26. See rejection of claim 2.

(5) With regard to claim 42, claim 42 inherits all the limitations of claim 26. See rejection of claim 18.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent 6,888,789) in view of Raleigh et al. (US Patent 6,452,981), as applied to claim 1.

With regard to claim 9, claim 9 inherits all the limitations of claim 1. Sakoda et al. in combination with Raleigh et al. do not disclose wherein the constellation is non-square.

However it is well known in the art that the shape of the constellation does not affect the self-similarity property.

Therefore claim 9 does not constitute patentability.

Allowable Subject Matter

15. Claims 3-7, 11, 13-17, 21, 25, 28-31, 33-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a method of selecting a bit load per sub-channel in a multi-carrier system. Prior art references show similar methods but fail to teach:

“determining an average number of bit errors in an erroneous tuple based on said probability and selecting is also based on the average number of bit errors in the erroneous tuple”, as in claim 3; “wherein said average number of bit errors in the erroneous tuple is determined as $w(b) = 12(2b) - (3b+2)2^{b/2-2b-4} / 6b(2b)$ ”, as in claims 4; “the probability $p(k,b)$ ”, as in claims 5, 29; “the probability $p(k,b)$ is determined”, as in claims 6, 30; “wherein said probability approaches $1/2k$ for constellations which have large values of b ”, as in claims 7, 31; “wherein said mean squared deviation of the number of bit errors in an erroneous tuple is determined based on the relationship as in claims 11, 35”; “wherein at large values of b , the mean square deviation of the number of bit errors in an erroneous tuple tends to be the square root of two”, as in claim 36; “access in a table of associated values of the number of bits and the values of the mean square deviation of the number of bit errors in an erroneous tuple to retrieve a value of a particular mean square deviation of the number of bit errors in an erroneous tuple for a particular value of b ”, as in claims 13, 37; “selecting at least

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one forward error correction parameter based on said adjusted target bit error rate", as in claims 14, 38; "determining a probability of having k bit errors in an erroneously decoded tuple", as in claims 15, 39; "wherein said constellation is non-square, and said probability of having bit errors in an erroneously decoded tuple of the non-square constellation is estimated as if said non-square constellation was a square constellation", as in claim 16; "wherein said constellation is non-square, and said probability of error of said non-square constellation become asymptotically close to the probability of error of a squared constellation encoder", as in claim 17; "determining a probability of having k bit errors in a n erroneously decoded tuple based on the self-similarity property of the constellation, wherein said probability of having k bit errors in an erroneously decoded tuple of the non-square constellation is estimated as if said non-square constellation was a square constellation", as in claims 21 and 25; "determining an average number of bit errors in an erroneous tuple based on said probability and selecting is also based on the average number of bit errors in the erroneous tuple", as in claim 28; "wherein the constellation is non-square", as in claim 33; "determining a mean square deviation of the number of bit errors in an erroneous tuple; wherein said selecting further comprises selecting the bit load per sub-channel based on said mean square deviation of the number of bit errors in a erroneous tuple", as in claim 34; "wherein said constellation is non-square, and said probability of having bit errors in an erroneously decoded tuple of the non-square constellation is estimated as if said non-square constellation was a

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square constellation", as in claim 40; **"wherein said constellation is non-square, and said probability of error of said non-square constellation becomes asymptotically close to the probability of error of a squared constellation encoder"**, as in claim 41 along with the remaining limitations of the independent claims.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 571-272-3047.

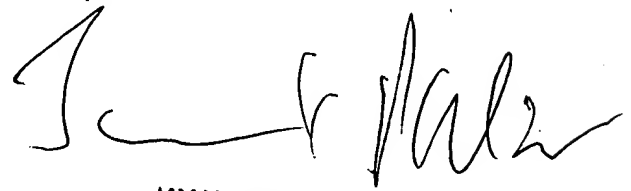
The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571-272-3021. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Cicely Ware

cqw
February 2, 2007



JAY K. PATEL
SUPERVISORY PATENT EXAMINER